

We Claim:

1. A needle device comprising:
  - a housing having a base for placement against a surface of a needle penetrating site, the base including a first opening;
  - a needle mounted for a movement between a retracted position in the housing and an extended position, a portion of the needle extending through the first opening in the extended position;
  - an actuator movably mounted to the housing and movable between an unactuated position in which the needle is in the retracted position and an actuated position in which the needle is in the extended position; and
  - a retraction mechanism that moves the needle to the retracted position upon releasing the base from the site surface.
2. A needle device according to claim 1, wherein the needle is biased toward a retracted position.
3. A needle device according to claim 3, wherein the retraction mechanism maintains the needle in the retracted position upon moving the actuator to the actuated position.
4. A needle device according to claim 1, wherein the retraction mechanism includes a trigger member movably mounted to the housing, the trigger member having a first portion adapted to engage the actuator and a second portion adapted to contact the site surface.
5. A needle device according to claim 4, wherein the trigger member is pivotally mounted to the housing.
6. A needle device according to claim 5, wherein the base further includes a second opening through which the second portion of the trigger member is adapted

to contact the site surface.

7. A needle device according to claim 4, wherein the housing has an actuator guide that guides the actuator through a predetermined path of movement.

8. A needle device according to claim 7, wherein the guide comprises a substantially U-shaped channel formed in the housing, the U-shaped channel comprising a first substantially vertical guide portion, a second substantially vertical guide portion, and a horizontal guide portion connecting lower ends of the first and second vertical portions.

9. A needle device according to claim 8, wherein the actuator is rotatably and vertically movably mounted to the housing, and further includes a pin adapted to be guided in the U-shaped channel.

10. A needle device according to claim 9, further including a spring that biases the actuator to the unactuated position, the spring having one end thereof fixedly mounted to the actuator and another end thereof fixedly mounted to the base to enable creation of a spring torsional load when the actuator is rotated relative to the base.

11. A needle device according to claim 10, wherein the spring is torsionally preloaded to rotate the actuator from the first vertical guide portion to the second vertical guide portion through the horizontal guide portion upon moving the actuator to the actuated position.

12. A needle device according to claim 10, wherein the first and second vertical guide portions are angled from the vertical so that moving the actuator to the actuated position torsionally loads the spring and biases the actuator to rotate to the second vertical guide portions through the horizontal guide portion.

13. A needle device according to claim 11 or 12, wherein the trigger member is pivotally mounted to the housing and the first portion thereof is adapted to engage the pin and prevent the actuator from moving to the unactuated position when the pin is positioned in the second vertical guide portion and the second portion thereof is contacting the site surface.

14. A needle device according to claim 13, wherein the base further includes a second opening through which the second portion of the trigger member is adapted to contact the site surface.

15. A needle device according to claim 14, wherein the actuator guide further includes a lock portion contiguous with the second vertical guide portion.

16. A needle device according to claim 15, wherein the spring torsional preloading further rotates the actuator into the lock portion to lock the actuator from moving to the actuated position.

17. A needle device according to claim 15, wherein the angled second vertical guide portion torsionally loads the spring as the pin is guided in the angled second vertical guide portion while the actuator is being moved to the unactuated position, and rotates the actuator into the lock portion as the torsional load is released, locking the actuator from moving to the actuated position.

18. A needle device according to claim 1, wherein the actuator comprises a depression member movably mounted to the housing and a needle holder movably mounted relative to the depression member.

19. A needle device according to claim 18, wherein the retraction mechanism includes at least one trigger member movably mounted to the housing, the trigger

20. A needle device according to claim 19, further including a first lock that locks the depression member relative to the housing upon the actuator being moved to the actuated position.

22. A needle device according to claim 21, wherein the second lock comprises a plurality of projections insertable through the depression member.

24. A needle device according to claim 6, further including a needle bending assembly that plastically bends the needle to misalign the needle from extending through the first opening.

26. A needle device according to claim 25, wherein the cam is integrally formed with the base and contiguous with the first opening and wherein the actuator is rotatably mounted to the housing.

27. A needle device according to claim 26, wherein the needle N is pre-bent at an acute angle and the bent needle rides on the cam to plastically deform the needle to about 90°.

28. A needle device comprising:

a housing having a base adapted to be placed next to a surface of a needle-penetrating site, the base including an opening;

a needle mounted for a movement between a retracted position in the housing and an extended position, where a portion of the needle extends through the opening when in the extended position;

an actuator movably mounted to the housing and movable between an unactuated position at which the needle is in the retracted position and an actuated position at which the needle is in the extended position, the actuator being biased toward the unactuated position;

a retraction mechanism that automatically moves the needle from the extended position to the retracted position.

29. A needle device according to claim 28, further comprising a locking mechanism that prevents the needle from moving back to the extended position once the needle has been moved from the extended position to the retracted position.

30. A needle device according to claim 29, wherein the locking mechanism is integral with the retraction mechanism.

31. A needle device according to claim 28, wherein the retraction mechanism includes a cover member for covering the opening after the needle moves from the extended position to the retracted position.

32. A needle device according to claim 31, wherein the retraction mechanism includes at least one linkage pivotally connected to the actuator and pivotally connected the cover member, wherein moving the actuator from the actuated position to the unactuated position moves the cover member and covers the opening.

33. A needle device according to claim 32, wherein the linkage has an axially extending slot having a first end and a second end, and a pivot pin connected to the actuator and guided in the slot, the pin being positioned in the first end when the actuator is in the unactuated position, and the pivot pin moving toward the second end as the actuator is moved to the actuated position, further including means for decreasing the effective length of the slot after the pivot pin is moved toward the second end.

34. A needle device according to claim 33, wherein the means for decreasing the effective length of the slot comprises a detent that creates a slot width dimensioned smaller than the pin, wherein a manual actuating force for moving the actuator to the actuated position is sufficient to force the pin past the detent, but the biasing force of the actuator toward the unactuated position is insufficient for the pin to clear the detent, but sufficient to move the cover member to make up for the slot length decrease.

35. A needle device according to claim 28, wherein the retraction mechanism includes at least one linkage pivotally connected to actuator, the linkage having an axially extending slot having a first end and a second end, and a pivot pin connected to the actuator and guided in the slot, the pin being positioned in the first end when the actuator is in the unactuated position, and the pivot pin moving toward the second end as the actuator is moved to the actuated position, further including means for decreasing the effective length of the slot after the pivot pin is moved toward the second end.

36. A needle device according to claim 35, wherein the means for decreasing the effective length of the slot comprises a detent that creates a slot width dimensioned smaller than the pin, wherein a manual actuating force for moving the actuator to the actuated position is sufficient to force the pin past the detent, but the biasing force of the actuator toward the unactuated position is insufficient for the pin to clear the detent, but sufficient to shift the linkage to make up for the slot length decrease.

37. A needle device according to claim 36, further including a needle bending mechanism for bending the needle upon moving the actuator to the actuated position after the actuator is moved from the actuated position to the unactuated position.

38. A needle device according to claim 37, wherein the needle bending mechanism is a cam formed adjacent to the slot and positioned to engage the needle and apply a bending moment that moves the needle to misalign with the opening in the base.

39. A needle device comprising:

- a housing having a base with an opening, the base with an opening being adapted to engage a surface of a needle penetrating site;

- a needle mounted for a movement between a retracted position in the housing and an extended position, where a portion of the needle extends through the opening;

- an actuator movably mounted to the housing for moving the needle to the extended position;

- a needle shield movably mounted relative to the housing between a retracted position and an extended position,

- wherein the needle shield is configured to automatically move to the

extended position upon removing the base from the site surface.

40. A needle device according to claim 39, wherein the needle shield is biased toward the extended position and is released to the extended position upon the needle being moved to the extended position and the base being released from the site surface.

41. A needle device according to claim 39, wherein the base has an adhesive layer for adhering the device the site surface, a portion of the adhesive layer being attached to a lower end of the needle shield, wherein the needle shield is freely movable toward the extended position when the needle is moved to the extended position, and wherein the adhesive layer portion adhered to the lower end of the needle shield and the site surface applies a pulling force as the base is removed from the skin site to automatically cover the needle.

42. A needle device according to claim 39, wherein the actuator includes a depression member and a needle holder movably mounted relative to the depression member, the needle holder holding the needle, wherein the needle holder is biased to move the needle to the extended position.

43. A needle device according to claim 42, further including a lock member engageable with the needle holder to maintain the needle in the retracted position, and a spring that biases the needle toward the extended position, wherein the depression member unlocks the lock member to allow the spring to propel the needle holder and the needle to the needle extended position.

44. A needle device according to claim 43, further including a safety tab movable between a lock position and an unlock position to lock the depression member.



45. A method of retracting a needle of a needle device comprising:  
attaching a housing having a base to a surface of a needle-penetrating site,  
the base including an opening;  
providing a needle mounted for a movement between a retracted position in  
the housing and an extended position, where a portion of the needle extends through  
the opening;  
pushing the needle to the extended position and into the surface of the site;  
releasing the needle into the retracted position by detaching the base from  
the surface of the needle-penetrating site.
46. A method according to claim 45, further comprising locking the needle in  
the retracted position by providing a needle holder or actuator with a pin and  
engaging the pin into a horizontally oriented slot formed in the housing.
47. A method according to claim 46, further comprising automatically rotating  
the needle holder or actuator so that the pin engages the slot.
48. A method of retracting a needle of a needle device comprising:  
positioning a housing having a base to a surface of a needle-penetrating site,  
the base including an opening;  
providing a needle mounted for a movement between a retracted position in  
the housing and an extended position, where a portion of the needle extends through  
the opening; and  
automatically covering the opening after the needle is moved from the  
extended position to the retracted position.
49. A method of retracting a needle of a needle device comprising:  
positioning a housing having a base to a surface of a needle-penetrating site,  
the base including an opening;  
providing a needle mounted for a movement between a retracted position in

the housing and an extended position, where a portion of the needle extends through the opening; and

bending the needle to misalign the needle from the opening when the needle is moved to the extended position after the needle is moved from the extended position back to the retracted position.

50. A method of rendering a needle device inoperative, comprising:

positioning a housing having a base to a surface of a needle-penetrating site, the base including an opening;

providing a needle mounted for a movement between a retracted position in the housing and an extended position, where a portion of the needle extends through the opening;

providing an actuator movably mounted to the housing for moving the needle to the extended position;

providing a needle shield movable between a retracted position and an extended position; and

moving the needle shield to the extended position upon removing the base from the site surface.

51. A method according to claim 50, further comprising biasing the needle shield toward the extended position so that the needle shield is moved to the extended position upon the base being released from the site surface, after moving the needle to the extended position.

52. A method according to claim 50, further comprising:

adhering the base and a lower end of the needle shield to the site surface;

enabling the needle shield to move freely toward the extended position when the needle is moved to the extended position; and

maintaining the lower portion of the needle shield adhered to the surface site while removing the base from the surface site to pull out the needle shield and cover

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the needle.

53. A method according to claim 50, further comprising propelling the needle to the extended position using a spring.

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